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PATENT 3/28/03
Hayes



Practitioner's Docket No. 55413 (71987)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re application of: P. Yuan et al.
Application No.: 09/718,669 Group No.: 2814
Filed: November 22, 2000 Examiner: D. Nguyen
For: TAPE CARRIER PACKAGE STRUCTURE WITH DUMMY PADS AND
DUMMY LEADS FOR PACKAGE REINFORCEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

AMENDMENT TRANSMITTAL

1. Transmitted herewith is a Response to Office Action for this application.

STATUS

2. Applicant is
☐ a small entity. A statement:
☐ is attached.
☐ was already filed.
☒ other than a small entity.

EXTENSION OF TERM

NOTE: "Extension of Time in Patent Cases (Supplement Amendments) -- If a timely and complete response has been filed after a Non-Final Office Action, an extension of time is not required to permit filing and/or entry of an additional amendment after expiration of the shortened statutory period.

CERTIFICATE OF MAILING/TRANSMISSION (37 C.F.R. SECTION 1.8(a))

I hereby certify that, on the date shown below, this correspondence is being:

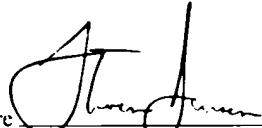
MAILING

- ☒ deposited with the United States Postal Service, as First Class Mail, postage prepaid, in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

FACSIMILE

- ☐ transmitted by facsimile to Group 2800 of the Patent and Trademark Office (703) 872-9318.

Date: March 10, 2003

Signature 
Steven M. Jensen

(type or print name of person certifying)

03/20/2003 ANABI1 00000071 09718669

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(Amendment Transmittal--page 1 of 4)

If a timely response has been filed after a Final Office Action, an extension of time is required to permit filing and/or entry of a Notice of Appeal or filing and/or entry of an additional amendment after expiration of the shortened statutory period unless the timely-filed response placed the application in condition for allowance. Of course, if a Notice of Appeal has been filed within the shortened statutory period, the period has ceased to run." Notice of December 10, 1985 (1061 O.G. 34-35).

NOTE: See 37 C.F.R. Section 1.645 for extensions of time in interference proceedings, and 37 C.F.R. Section 1.550(c) for extensions of time in reexamination proceedings.

3. The proceedings herein are for a patent application and the provisions of 37 C.F.R. Section 1.136 apply.

(complete (a) or (b), as applicable)

- (a) ☒ Applicant petitions for an extension of time under 37 C.F.R. Section 1.136 (fees: 37 C.F.R. Section 1.17(a)(1)-(4)) for the total number of months checked below:

	Extension (months)	Fee for other than small entity	Fee for small entity
<input type="checkbox"/>	one month	\$ 110.00	\$ 55.00
<input type="checkbox"/>	two months	\$ 410.00	\$ 205.00
<input checked="" type="checkbox"/>	three months	\$ 930.00	\$ 465.00
<input type="checkbox"/>	four months	\$ 1,450.00	\$ 725.00

Fee: \$ 930.00

If an additional extension of time is required, please consider this a petition therefor.

(check and complete the next item, if applicable)

- ☐ An extension for _____ months has already been secured. The fee paid therefor of \$ _____ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request \$ _____

OR

- (b) ☐ Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition for extension of time.

FEE FOR CLAIMS

4. The fee for claims (37 C.F.R. Section 1.16(b)-(d)) has been calculated as shown below:

(Col. 1) (Col. 2) (Col. 3) SMALL ENTITY					OTHER THAN A SMALL ENTITY			
Claims Remaining After Amendment		Highest No. Previously Paid For	Present Extra	Rate	Addit. Fee	OR	Rate	Addit. Fee
Total	** Minus	**	=	x \$9 =	\$		x \$18 =	\$
Indep.	** Minus	**	=	x \$42 =	\$		x \$84 =	\$
[] First Presentation of Multiple Dependent Claim				+ \$140 =	\$		+ \$280 =	\$
					Total Addit. Fee	\$	OR Total Addit. Fee	\$

* If the entry in Col. 1 is less than the entry in Col. 2, write "O" in Col. 3.

** If the "Highest No. Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest No. Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest No. Previously Paid For" (Total or Indep.) is the highest number found in Col. 1 of a prior amendment or the number of claims originally filed.

WARNING: "After final rejection or action (Section 1.113) amendments may be made canceling claims or complying with any requirement of form which has been made." 37 C.F.R. Section 1.116(a) (emphasis added).

(complete (c) or (d), as applicable)

(c) [X] No additional fee for claims is required.

OR

(d) [] Total additional fee for claims required \$

FEE PAYMENT

5. [X] Attached is a check in the sum of \$ 930.00.
 [] Charge Account No. 04-1105 the sum of \$_____.

FEE DEFICIENCY

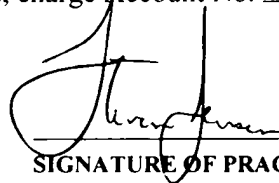
NOTE: If there is a fee deficiency and there is no authorization to charge an account, additional fees are necessary to cover the additional time consumed in making up the original deficiency. If the maximum, six-month period has expired before the deficiency is noted and corrected, the application is held abandoned. In those instances where authorization to charge is included, processing delays are encountered in returning the papers to the PTO Finance Branch in order to apply these charges prior to action on the cases. Authorization to charge the deposit account for any fee deficiency should be checked. See the Notice of April 7, 1986, (1065 O.G. 31-33).

6. [X] If any additional extension and/or fee is required, charge Account No. 04-1105.

AND/OR

- [X] If any additional fee for claims is required, charge Account No. 04-1105.

Date: March 10, 2003


SIGNATURE OF PRACTITIONER

Reg. No. 42,693

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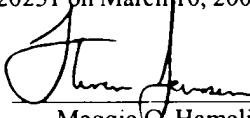
Docket No. 55413 (71987)

THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: P. Yuan et al.
U.S.S.N.: 09/718,669 GROUP: 2814
FILED: November 22, 2000 EXAMINER: D. Nguyen
FOR: TAPE CARRIER PACKAGE STRUCTURE WITH DUMMY PADS
AND DUMMY LEADS FOR PACKAGE REINFORCEMENT

CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, DC, 20231 on March 10, 2003.

By: 
Maggie Hamelin

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

RESPONSE TO OFFICE ACTION

Applicants are in receipt of the Office Action dated September 9, 2002 of the above-referenced application. A request for a three-month extension of time is submitted herewith. Applicants respond to the Office Action as follows.

Applicants' invention is directed to a tape carrier package (TCP) structure having dummy pads and dummy leads for package reinforcement. Specifically, independent claims 1, 6, and 10 recite a plurality of dummy pads arranged on the corners of the package, and a group of dummy leads bonded between the dummy pads and corner-situated lead bonding areas on the tape carrier, whereby this bonding arrangement of the dummy pads and dummy leads provides firm support to the corners of the semiconductor chip, so as to hold the semiconductor chip in position

with respect to the tape carrier and to enhance mechanical strength of the tape carrier package structure.

As shown in FIG. 2A of the application, two dummy pads 212 marked in *black* are provided immediately at each corner of semiconductor chip 210, where functional I/O pads 211 and the non-functional dummy pads 212 form a perfect rectangle, such that an imaginary line can be drawn diagonally through the center of the semiconductor chip 210 to connect the dummy pads 212 in each corner.

As shown in FIG. 2B, dummy leads 232 are bonded to corner-situated lead-bonding areas 222, thereby providing firm support to the corners of the semiconductor chip and reinforcing the mounting of the semiconductor chip 210 on the tape carrier 220. As discussed in the specification, the dummy leads 232 are spaced apart at the same pitch as the I/O leads 231, so that the pitch of the I/O leads 231 and dummy leads 232 can be substantially equally spaced (see page 6, lines 3-5).

The above-described semiconductor package structure can yield significant benefits. By providing the claimed arrangement of dummy pads and dummy leads, the corners of the packaged semiconductor chip can be firmly supported during the potting process, so that the encapsulation material will be more evenly distributed on the back side of the semiconductor chip, thereby preventing popcorn effect and delamination.

Claims 1-12 were rejected under 35 USC 103(a) as being unpatentable over U.S. Patent 6,268,644 to Umehara et al. (hereinafter "Umehara") in view of U.S. Patent 6,265,762 to Tanaka et al. (hereinafter "Tanaka") and U.S. Patent 6,060,770 to Nakamura et al. (hereinafter "Nakamura"). This rejection is respectfully traversed.

Umehara fails to teach or suggest a group of dummy leads which are bonded between dummy pads on the semiconductor chip and corner-situated lead-bonding areas on the tape carrier to provide firm support to the corners of the semiconductor chip, so as to hold the

semiconductor chip in position with respect to the tape carrier and to enhance mechanical strength of the tape carrier package structure.

Umehara is directed to a resin-sealed semiconductor device including dam members positioned at the corner of a semiconductor chip, which prevent adjacent wires from contacting each other when subjected to the flow of a molding resin, in order to prevent short circuiting of the wires. In Umehara, the dam members are arranged between the two closest of the wires, at least one dam member being a dummy wire.

With reference to FIG. 3 of Umehara, the flow of molding resin is indicated by an arrow, in a direction approximately perpendicular to the orientation of wires 14 and 17. The wires 17 are bent according to a wire deformation formula discussed in Umehara (see column 6, lines 5-8) to suppress the flow velocity of the molding resin and minimize the influence on the downstream side of the dummy wires. As shown in FIG. 3, the dummy electrode pads 16 are formed adjacent to the electrode pads 13a of the semiconductor chip 13, but are not formed directly in the corners (i.e., on an imaginary diagonal line from the center to the corner of the chip). The structure taught in Umehara contains only empty space at the corner of the chip. There is no teaching or suggestion in Umehara of increasing the mechanical strength of the package or preventing the underflow of encapsulation material.

Accordingly, Umehara does not teach or suggest providing dummy pads and dummy leads immediately at the corners of the chip to enhance mechanical strength of the TCP package. Umehara is directed to the problem of short circuiting of wires in semiconductor devices, and does not teach or suggest the arrangement of dummy pads and dummy leads disclosed in the Applicants' claimed invention which provide structural reinforcement at the corners of a semiconductor package. Moreover, Umehara is directed to preventing short circuits of wires in BGA or TQFP packages, but does not disclose applicability to TCP packages, which have the smallest pitch of all packages.

The Tanaka and Nakamura references cannot be combined with Umehara to produce the Applicants' claimed invention. Tanaka discloses a lead frame and semiconductor device which also seeks to overcome the problem of short circuiting due to spacing between adjacent wires. In a quad flat package (QFP) type semiconductor device, Tanaka teaches that the pad pitch of pad electrodes located at the corners of a semiconductor chip should be made wider than the pad pitch of other pad electrodes (see column 2, lines 63-65).

With reference to FIG. 6 of Tanaka, the pitch between the peripheral pads from P1 to P4 increases by a factor of 1.1 (see column 6, lines 49-57), and the pad pitch P5 between the pad electrode 11 at the outer end of the peripheral portion and the pad electrode 11 at another outer end of the peripheral portion, which is adjacent to the pad electrode 11 at the corner of the semiconductor chip 10, is made wider than the other pad pitch and is made wider than the lead pitch P6 at this portion "from a point of pulling around the wires 13" (see column 7, lines 1-8). Therefore, the Tanaka reference clearly teaches away from the Applicants' claimed invention (in which dummy leads are spaced apart at the same pitch as the I/O leads). In Tanaka, the wider pitch at the corners would lead to substantial underflow of encapsulation material, resulting in the popcorn effect and delamination. Tanaka could not be combined with Umehara to produce the Applicants' claimed invention, and moreover, does not disclose enhancing the mechanical strength of the package by placing dummy leads and dummy pads immediately at the corner of the chip.

Nakamura also fails to remedy the deficiencies of the Umehara reference. Nakamura is directed to a semiconductor device having a TCP with a one-sided pad arrangement. To overcome tilting of the semiconductor chip during a potting process, Nakamura teaches a device in which dummy pads in an electrically floating state are disposed in an area different from the area where the bonding pads on the major surface of the semiconductor chip are disposed. Nakamura teaches the use of a plurality of dummy pads preferably located at opposite corners of the main pad arrangement to provide support to the chip during the resin potting process.

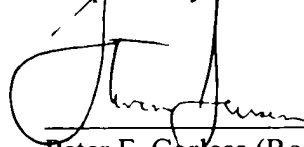
Nakamura addresses the problem of tilting of the chip to reduce overall package thickness, but does not teach or suggest any structure for enhancing the mechanical strength of the package. For example, as shown in FIG. 4, dummy pads 6b are connected to dummy leads 5a in only one direction, so the corners of the chip cannot be secured to withstand the impact of resin in multiple directions. In the Office Action, column 5, lines 64-67 of Nakamura was cited for the proposition of enhancing mechanical strength of the tape carrier structure. However, that passage of Nakamura refers only to dummy pads 6b, which prevent the insulating tape 4 from shifting in position, but does not address any aspects of enhancing mechanical strength of a tape carrier package as recited in the Applicants' claimed invention. Therefore, Nakamura cannot be combined with Umehara and/or Tanaka to produce the Applicants' claimed invention.

Finally, there is no teaching or suggestion in any of the references, or considering the level of ordinary skill in the art, to combine Umehara with Tanaka or Nakamura. As discussed above, Umehara and Tanaka teach devices for preventing short-circuits, and Tanaka clearly teaches away from the Applicants' claimed invention. The one-sided pad arrangement of Nakamura is clearly different from the Applicants' claimed invention. Accordingly, Applicants respectfully request reconsideration in view of the above-referenced remarks.

It is believed the application is in condition for immediate allowance, which action is earnestly solicited.

Date: March 10, 2003

Respectfully submitted,



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